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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,972	10/24/2003	Masanori Umeya	DAIN:756	6972

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EXAMINER	
TSOY, ELENA	
ART UNIT	**PAPER NUMBER**
1762	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/691,972	UMEYA, MASANORI	
	Examiner	Art Unit	
	Elena Tsoy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

Amendment filed on January 9, 2007 has been entered. Claim 5 has been cancelled. Claims 1-4, 6-8 are pending in the application.

Claim Objections

1. Objection to claim 5 under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim has been withdrawn due to cancellation of the claim.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Rejection of claims 1-7 under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps has been withdrawn due to amendment.

4. Claims 1-4, and 6-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a second step of *heating* **beyond** its phase transition temperature and a third step of *supercooling* **beyond** its phase transition temperature, which renders the claim indefinite because the same term "beyond" is used for different processes. For examining purposes the phrase was interpreted as a second step of *heating* **beyond** its phase transition

temperature and a third step of *supercooling* **below** its phase transition temperature, according to Applicants disclosure (See P26).

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-4, and 6-8 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nishimura (US 6671031).

Nishimura are applied here for the same reasons as set forth in paragraph 6 of the Office Action mailed on 10/30/2006. As to amendment, Nishimura discloses a process which is substantially identical to that described by Applicants disclosure. Namely, the applied coat layer of cholesteric liquid crystal solution is heated by *hot plate* or in a drying *oven* to **vaporize** the **solvent** from the coat layer (claimed second step of heating beyond its phase transition

temperature) (compare column 12, lines 13-22 of Nishimura and P23 of the Applicants' specification). Nishimura teaches that depending upon the composition of the liquid crystal material contained in the coat layer, the cholesteric **alignment formation** may sometimes be completed in a thermotropic manner at a temperature at which the solvent is removed (See column 12, lines 23-27). Therefore, there may be a case where **no more** alignment layer **treatment** is required. However, the dried coat layer is required to undergo a heat treatment at temperatures of 50-180^{0}C (See column 12, lines 56-59) after the drying process in order to render the alignment of the liquid crystal *more complete* and *to effect the crosslinking reaction* (See column 12, lines 27-33). When the alignment formation is performed by a heat treatment, this heat treatment and the crosslinking reaction can also be carried out *separately* in their mutually different heat treatment atmospheres (See column 12, lines 34-37). It is desirably to select such liquid crystalline polymer and crosslinking substance that the crosslinking reaction proceeds *after* the alignment formation within the temperature range (See column 12, lines 59-62). **After** the heat treatment, **cooling** is preferably conducted, if required (claimed third step of supercooling beyond its phase transition temperature) (See column 13, lines 20-21) to fix the cholesteric alignment by a cooling operation after forming the alignment (See column 13, lines 25-29). No particular limitation is imposed on the cooling treatment. It may be conducted, for example, by transferring the film from the heat treatment atmosphere required for the alignment formation to the **room temperature** condition and allowing it to cool. Alternatively, if required, the cooling treatment may also be conducted by using forced cooling means such as water-cooling. See column 13, lines 29-36. In other words, Nishimura teaches various possible embodiments of his invention such as completing the cholesteric **alignment formation** in a

thermotropic manner at a temperature at which the solvent is removed *without* additional heat treatment, cooling the cholesteric crystal layer **aligned** *either* by solvent removing heat treatment *or* by solvent removing heat treatment and additional heat treatment to the **room temperature** condition. Besides, language of claim 1 does not recite a negative limitation against second heat treatment before cooling to a room temperature.

Applicants' describe their invention as follows: as shown in FIG. 1(b), the film 13 of the cholesteric liquid crystal solution is heated at a temperature between 50.degree. C. and 90.degree. C. by a *hot plate* or the like in order to *remove the solvent* from the film 13 by evaporation, thereby obtaining an uncured cholesteric liquid crystal film 14 (See P23); thereafter, the uncured cholesteric liquid crystal film 14 formed on the glass substrate 11 is left as it is at *room temperature* (e.g., 25.degree. C.) for a predetermined period of time (See P24). In the step shown in FIG. 1(c), the cholesteric liquid crystal film 14 **may be heated** or shaken in order to more **fully** align liquid crystalline molecules in it. Further, the step shown in FIG. 1(c) is not necessarily essential and can be omitted if liquid crystalline molecules in the cholesteric liquid crystal film 14 are fully aligned in the step shown in FIG. 1(b) (See P24). Compare this statement with Nishimura discussed above: "However, the dried coat layer is required to undergo a heat treatment at temperatures of 50-180^{0}C (See column 12, lines 56-59) after the drying process in order to render the alignment of the liquid crystal *more complete* and *to effect the crosslinking reaction*" (See column 12, lines 27-33). Thus, a method of Nishimura is substantially identical to that described by Applicants disclosure.

Since Applicants' specification describes that supercooling phase is achieved by leaving the film after heating at room temperature (See Abstract and P11), the step of transferring the

film from the heat treatment atmosphere required for the alignment formation to the **room** temperature condition and **allowing it to cool** in Nishimura achieves claimed supercooling phase.

8. Claims 1-4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamoto et al (US 6882475) in view of Nishimura, further in view of Gibbons et al (US 6103322) for the reasons discussed above and for the reasons of record set forth in paragraph 7 of the Office Action mailed on 10/30/2006. Note that Kawamoto et al teach a second step of **volatilizing** the solvent, and heating the cholesteric liquid-crystal polymer to 160^0C so that liquid crystal was aligned, then cooling the liquid-crystal polymer to **room** temperature (claimed third step of supercooling) (See column 9, lines 23-26). Thus, steps of forming aligned choleteric liquid crystal layer are substantially identical to that described in Nishimura.

Kawamoto et al fail to teach that the cholesteric liquid-crystal polymer is a photopolymerisable polymer which is cured at room temperature by radiation (Claim 1).

Nishimura is applied here for the same reasons as above. Nishimura teaches that the use of a photopolymerisable *circularly* polarizing cholesteric liquid-crystal polymer which is cured at room temperature by radiation allows to fix the cholesteric alighnment (See above).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a photopolymerisable *circularly* polarizing cholesteric liquid-crystal polymer for forming aligned choleteric liquid crystal layer in Kawamoto et al with the expectation of providing the desired fixed cholesteric alighnment, as taught by Nishimura, since Kawamoto et al teach that there is no particular limitation in kind of the cholesteric liquid-crystal layer.

Kawamoto et al in view of Nishimura fail to teach that instead of laminating preformed layers, a further cholesteric liquid-crystal polymer layer is formed on the cured cholesteric liquid-crystal polymer layer (Claim 6).

As was discussed paragraph 7 of the Office Action mailed on 10/30/2006, Gibbons et al teach that casting of cholesteric liquid crystal medium onto a substrate layer is functionally equivalent to laminating a preformed cholesteric liquid crystal film onto the substrate layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a second cholesteric liquid-crystal polymer layer in Kawamoto et al in view of Nishimura by casting using a method of Nishimura instead of laminating preformed layers since Gibbons et al teach that casting of cholesteric liquid crystal medium onto a substrate layer is functionally equivalent to laminating a preformed cholesteric liquid crystal film onto the substrate layer.

9. Claims 1-4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kameyama et al (US 6166790) in view of Nishimura, further in view of Gibbons et al.

Kameyama et al are applied here for the same reasons as set forth in paragraph 8 of the Office Action mailed on 10/30/2006. As was discussed there, Kameyama et al teach that the liquid crystal polymers can be developed, for example, by methods in which solutions of the liquid crystal polymers in solvents are developed in thin layers by e.g. cast film formation, followed by drying (See column 7, lines 6-15). The heating treatment for *orienting* developed layers of the liquid crystal polymers can be conducted by heating the layers within the temperature range from the glass transition temperature to the isotropic phase transition temperature, namely within the temperature range in which the liquid crystal polymers exhibit

liquid crystal phases (See column 7, lines 24-30). Further, the oriented state can be fixed by *natural* **cooling** the layers to less than the glass transition temperature, and there is no particular limitation on the cooling conditions (See column 7, lines 30-39).

Thus, steps of forming aligned choleteric liquid crystal layer in Kameyama et al are substantially identical to that described in Nishimura except for drying is performed by heating at temperature of alignment. However, Nishimura teaches that aligned choleteric liquid crystal layer may be formed while evaporating the solvent. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have evaporated solvent in Kameyama et al by heating with the expectation of providing the desired aligned choleteric liquid crystal layer, as taught by Nishimura.

Kameyama et al also fail to teach that the cholesteric liquid-crystal polymer is a photopolymerisable polymer which is cured at room temperature by radiation (Claim 1).

Nishimura are applied here for the same reasons as above. Nishimura teaches that the use of a photopolymerisable *circularly* polarizing cholesteric liquid-crystal polymer which is cured at room temperature by radiation allows to fix the cholesteric alighnment (See above).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a photopolymerisable *circularly* polarizing cholesteric liquid-crystal polymer in Kameyama et al with the expectation of providing the desired fixed cholesteric alighnment, as taught by Nishimura, since Kameyama et al teach that there is no particular limitation on the cholesteric liquid crystal polymers.

Kameyama et al in view of Nishimura fail to teach that instead of laminating preformed layers, a further cholesteric liquid-crystal polymer layer is formed on the cured cholesteric liquid-crystal polymer layer (Claim 6).

Gibbons et al are applied here for the same reasons as above. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a second cholesteric liquid-crystal polymer layer in Kameyama et al in view of Nishimura by casting using a method of Nishimura instead of laminating preformed layers since Gibbons et al teach that casting of cholesteric liquid crystal medium onto a substrate layer is functionally equivalent to laminating a preformed cholesteric liquid crystal film onto the substrate layer.

10. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura in view of Kawamoto et al/Kameyama et al/, further in view of Gibbons et al for the reasons discussed above and for the reasons of record set forth in paragraph 7 of the Office Action mailed on 10/30/2006.

Response to Arguments

11. Applicants' arguments filed January 9, 2007 have been fully considered but they are not persuasive.

(A) Applicants argue that in contrast to the claimed invention, Nishimura fails to disclose, teach or suggest the combination of steps of heating the film beyond its phase transition temperature, thereby obtaining an uncured cholesteric liquid crystal film, followed by supercooling the uncured cholesteric liquid crystal film beyond its phase transition temperature and applying, for curing, radiation to the uncured cholesteric liquid crystal film, as claimed. Instead, Nishimura in fact teaches that "the light irradiation may properly be conducted after

reheating the coat layer so as to impart the fluidity thereto because of the low cross-linking rate of the liquid crystal layer." See Nishimura at col. 14, lines 11-16 (emphasis added). Thus, Nishimura not only fails to teach or suggest the particular limitations of claim 1,

but in fact teaches directly the opposite. That is, while the claimed invention performs the radiation curing to the uncured cholesteric liquid crystal film in the supercooled state, Nishimura teaches light irradiation after reheating the coat layer so as to impart the fluidity to the coat layer. Nishimura does not teach or suggest that light irradiation could or should be conducted when the uncured cholesteric liquid crystal film is in the supercooled state.

The Examiner respectfully disagrees with this argument because **a method of Nishimura is substantially identical to that described by Applicants disclosure** (See P6 above). Besides, language of claim 1 does not recite a negative limitation against second heat treatment before cooling to a room temperature.

(B) Applicants argue that none of Kawamoto, Nishimura and Gibbons, teaches or suggests the features of independent claim 1 of heating the film beyond its phase transition temperature, thereby obtaining an uncured cholesteric liquid crystal film, followed by supercooling the uncured cholesteric liquid crystal film beyond its phase transition temperature and applying, for curing, radiation to the uncured cholesteric liquid crystal film. The Office Action admits that Kawamoto does not teach these limitations. Further, as described above, Nishimura not only fails to teach or suggest these limitations, but teaches directly the opposite that "the light irradiation may properly be conducted after reheating the coat layer so as to impart the fluidity thereto because of the low cross-linking rate of the liquid crystal layer" (emphasis added). Rather than teaching the claim limitations, as asserted in the Office Action, Nishimura

teaches directly the opposite and thus teaches away from the claimed invention. Neither Nishimura, nor Kawamoto or Gibbons, teach or suggest that light irradiation could or should be conducted when the uncured cholesteric liquid crystal film is in the supercooled state.

The Examiner respectfully disagrees with this argument. First of all, language of claim 1 does not recite a negative limitation against second heat treatment before cooling to a room temperature. Secondly, Kawamoto et al teach second step of **volatilizing** the solvent, heating the cholesteric liquid-crystal polymer to 160^0C so that liquid crystal was aligned, then cooling the liquid-crystal polymer to **room** temperature just like in Applicants' process (See above). Thus, in contrast to Applicants argument, Kawamoto in view of Nishimura teach the features of independent claim 1 of heating the film beyond its phase transition temperature, thereby obtaining an uncured cholesteric liquid crystal film, followed by supercooling the uncured cholesteric liquid crystal film beyond its phase transition temperature and applying, for curing, radiation to the uncured cholesteric liquid crystal film.

(C) Applicants argue that none of Kameyama et al, Nishimura and Gibbons teaches or suggests the features of independent claim 1 of heating the film beyond its phase transition temperature, thereby obtaining an uncured cholesteric liquid crystal film, followed by supercooling the uncured cholesteric liquid crystal film beyond its phase transition temperature and applying, for curing, radiation to the uncured cholesteric liquid crystal film.

The Examiner respectfully disagrees with this argument for the reasons discussed above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy
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ELENA TSOY
PRIMARY EXAMINER

February 26, 2007